Class 9th

* Maths

Exercise

* No: 5.2

* Q No: (1 - 16)

* Done!

Radical Equation:-

* Symbol: $\sqrt{\ }$

EXERCISE #5.2

Basic Concepts:

Radical Equation:
An equation in which the unknown (variable) appears under a radical sign is called a radical equation

Symbol:
$\sqrt{\ }$

Example:
$\sqrt{x+1} = 3$

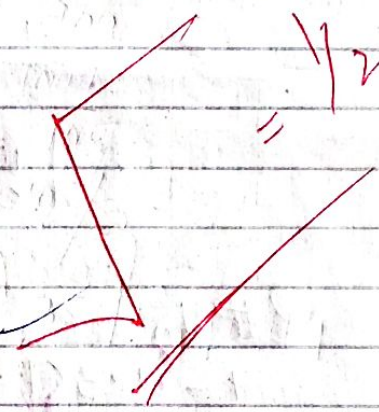
Linear Equation:
An equation in which exponent/power of unknown (variable) is always 1 is called linear equation.

Example:
$x+1=7$

Extraneous Root:
A solution to an equation seems to be right but when we check it (by substituting it into the original equation) we find it is NOT right.

OR

See book pg#



اگر radical sign برابر آجائے کسی solutions کو اس کی values (-) نہیں ہوتا۔

Q NO:-1

$\sqrt{2x} = 4$

Solve:

$\sqrt{2x} = 4$

Taking Square on b/s

$(\sqrt{2x})^2 = (4)^2$

$2x = 16$

$x = \frac{16}{2}$

$\boxed{x = 8}$

Check:-

put $x = 8$ in original equ

$\sqrt{2x} = 4$

$\sqrt{2(8)} = 4$

$\sqrt{16} = 4$

$\boxed{4 = 4}$

S.S = {8}

Q NO: 2

$\sqrt{x-3} = 2$

Solve:

$\sqrt{x-3} = 2$

Taking Square on b/s

$(\sqrt{x-3})^2 = (2)^2$

$x - 3 = 4$

$x = 4 + 3$

$\boxed{x = 7}$

check:

put $x = 7$ in original equation

$\sqrt{x-3} = 2$

$\sqrt{7-3} = 2$

$\sqrt{4} = 2$

$\boxed{2 = 2}$

S.S = {7}

Q NO:-3

$\sqrt{x-5} = 3$

Solve:

$\sqrt{x-5} = 3$

Taking square on b/s

$(\sqrt{x-5})^2 = (3)^2$

$x - 5 = 9$

$x = 9 + 5$

$\boxed{x = 14}$

put $x = 14$ in original equation

$\sqrt{x-5} = 3$

$\sqrt{14-5} = 3$

$\sqrt{9} = 3$

$3 = 3$

S.S = {14}

Q NO:-4

$\sqrt{2x+1} = 9$

Solve:

$\sqrt{2x+1} = 9$

Taking Square on b/s

$(\sqrt{2x+1})^2 = (9)^2$

$2x + 1 = 81$

$2x = 81 - 1$

$2x = 80$

$x = \frac{80}{2}$

$\boxed{x = 40}$

Check:-

put $x = 40$ in original equation

$\sqrt{2x+1} = 9$

$\sqrt{2(40)+1} = 9$

$\sqrt{80+1} = 9$

$\sqrt{81} = 9$

$\boxed{9 = 9}$

$S.S = \{40\}$

Q NO:- 5

$\sqrt{5x-4} = 14$

Solve:

$\sqrt{5x-4} = 14$

Taking Square on b/s:

$(\sqrt{5x-4})^2 = (14)^2$

$5x - 4 = 196$

$5x = 196 + 4$

$5x = 200$

$x = \frac{200}{5}$

$\boxed{x = 40}$

Check:

put $x = 40$ in original equation

$\sqrt{5x-4} = 14$

$\sqrt{5(40)-4} = 14$

$\sqrt{200-4} = 14$

$\sqrt{196} = 14$

$\boxed{14 = 14}$

$S.S = \{40\}$

Q NO: 6

$\sqrt{3x-5} = -10$

Solve:

When radical term is equal to a negative number, such equation has no solution in real number.

$S.S = \{\}$ or ϕ

$\sqrt{3x-5} = -10$

Taking square on b/s

$(\sqrt{3x-5})^2 = (-10)^2$

$3x - 5 = 100$

$3x = 100 + 5$

$3x = 105$

$x = 105/3$

$\boxed{x = 35}$

Check:

$\sqrt{3x-5} = -10$

$\sqrt{3(+35)-5} = -10$

$\sqrt{105-5} = -10$

$\sqrt{100} = -10$

$+10 \neq -10$

So

$x = 35$ is extraneous root

$S.S = \{\}$ or ϕ

Q NO: 7

$\sqrt{y+4} - 3 = 2$

Solve:

$\sqrt{y+4} - 3 = 2$

$\sqrt{y+4} = 2+3$

$\sqrt{y+4} = 5$

Taking square on b/s:

$(\sqrt{y+4})^2 = (5)^2$

$y+4 = 25$

$y = 25-4$

$\boxed{y = 21}$

Check:

put $y = 21$ in original equation

$\sqrt{y+4} - 3 = 2$

$\sqrt{21+4} - 3 = 2$

$\sqrt{25} - 3 = 2$

$5 - 3 = 2$

$\boxed{2 = 2}$

$S.S = \{21\}$

Q NO: 8

$5 + \sqrt{2x-1} = 0$

Solve:

$5 - \sqrt{2x-1} = 0$

$5 = \sqrt{2x-1}$

Taking square on both side

$(5)^2 = (\sqrt{2x-1})^2$

$25 = 2x-1$

$25+1 = 2x$

$26 = 2x$

$\frac{26}{2} = x$

$13 = x$

$\boxed{x = 13}$

put $x = 13$ in original equation

$5 - \sqrt{2x-1} = 0$

$5 - \sqrt{2(13)-1} = 0$

$5 - \sqrt{26-1} = 0$

$5 - \sqrt{25} = 0$

$5 - 5 = 0$

$\boxed{0 = 0}$

$S.S = \{13\}$

Q NO: 9

isolated (separate b/s)

$\sqrt{y+1} - 12 = -10$

Solve:

$\sqrt{y+1} - 12 = -10$

$\sqrt{y+1} = -10+12$

$\sqrt{y+1} = 2$

Taking square on b/s

$(\sqrt{y+1})^2 = (2)^2$

$y+1 = 4$

$y = 4-1$

$\boxed{y = 3}$

Check:

put $y = 3$ in original equation

$\sqrt{y+1} - 12 = -10$

$\sqrt{3+1} - 12 = -10$

$\sqrt{4} - 12 = -10$

$2 - 12 = -10$

$\boxed{-10 = -10}$

$S.S = \{3\}$

Q NO: 10

$\sqrt{5t-2} = \sqrt{3t+4}$

Solve:

$\sqrt{5t-2} = \sqrt{3t+4}$

Taking Square on b/s:

$(\sqrt{5t-2})^2 = (\sqrt{3t+4})^2$

$5t-2 = 3t+4$

$5t-3t = 4+2$

$2t = 6$

$t = 6/2$

$\boxed{t=3}$

Check:-

put $t=3$ in original equation

$\sqrt{5t-2} = \sqrt{3t+4}$

$\sqrt{5(3)-2} = \sqrt{3(3)+4}$

$\sqrt{15-2} = \sqrt{9+4}$

$\sqrt{13} = \sqrt{13}$

$S.S = \{3\}$

Q NO: 11

$\sqrt{9-2x} = \sqrt{5x-12}$

Solve:

$\sqrt{9-2x} = \sqrt{5x-12}$

Taking Square on b/s:

$(\sqrt{9-2x})^2 = (\sqrt{5x-12})^2$

$9-2x = 5x-12$

$9+12 = 5x+2x$

$21 = 7x$

$\frac{3\cancel{21}}{\cancel{7}} = x$

$3 = x$

$\boxed{x=3}$

Check:

put $x=3$ in original equation

$\sqrt{9-2x} = \sqrt{5x-12}$

$\sqrt{9-2(3)} = \sqrt{5(3)-12}$

$\sqrt{9-6} = \sqrt{15-12}$

$\sqrt{3} = \sqrt{3}$

$S.S = \{3\}$

Q NO: 12

$12 - \sqrt{y+1} = 14$

Solve:

$12 - \sqrt{y+1} = 14$

$12 - 14 = \sqrt{y+1}$

$-2 = \sqrt{y+1}$

$\sqrt{y+1} = -2$

When radical term is equal to negative number then such equation has no solution in real number

$\sqrt{y+1} = -2$

Taking Square on b/s:-

$(\sqrt{y+1})^2 = (-2)^2$

$y+1 = 4$

$y = 4-1$

$\boxed{y=3}$

put $y=3$ in original equation

$12 - \sqrt{y+1} = 14$

$12 - \sqrt{3+1} = 14$

$12 - \sqrt{4} = 14$

$12 - 2 = 14$

$10 \neq 14$

$\therefore S = \{\ \}$ or ϕ

Q NO: 13

$4\sqrt{z} + 8 = 40$

Solve:

$4\sqrt{z} + 8 = 40$

$4\sqrt{z} = 40 - 8$

$4\sqrt{z} = 32$

$\sqrt{z} = \frac{32}{4}$

$\sqrt{z} = 8$

Taking Square on b/s:

$(\sqrt{z})^2 = (8)^2$

$z = 8 \times 8$

$\boxed{z = 64}$

put $z=64$ in original equation

$4\sqrt{z} + 8 = 40$

$4\sqrt{64} + 8 = 40$

$4(8) + 8 = 40$

$32 + 8 = 40$

$\boxed{40 = 40}$

$\therefore S = \{64\}$

Q NO: 14

$\sqrt{\frac{a+6}{a+2}} = \sqrt{\frac{a+2}{a-1}}$

Solve:

$\sqrt{\frac{a+6}{a+2}} = \sqrt{\frac{a+2}{a-1}}$

Taking square on both side:

$\left(\sqrt{\frac{a+6}{a+2}}\right)^2 = \left(\sqrt{\frac{a+2}{a-1}}\right)^2$

$\frac{a+6}{a+2} = \frac{a+2}{a-1}$

$(a+6)(a-1) = (a+2)(a+2)$

$a(a-1) + 6(a-1) = a(a+2) + 2(a+2)$

$a^2 - a + 6a - 6 = a^2 + 2a + 2a + 4$

$a^2 + 5a - 6 = a^2 + 4a + 4$

$a^2 + 5a - 6 - a^2 - 4a - 4 =$

$a^2 - a^2 + 5a - 4a - 6 - 4 =$

$a - 10 = 0$

$\boxed{a = 10}$

put $a = 10$ in original equation

$$\sqrt{\frac{a+6}{a+2}} = \sqrt{\frac{a+2}{a-1}}$$

$$\sqrt{\frac{10+6}{10+2}} = \sqrt{\frac{10+2}{10-1}}$$

$$\sqrt{\frac{16\cancel{4}}{\cancel{12}_3}} = \sqrt{\frac{\cancel{12}\ 4}{\cancel{9}_3}}$$

$$\sqrt{\frac{4}{3}} = \sqrt{\frac{4}{3}}$$

$$\frac{\sqrt{4}}{\sqrt{3}} = \frac{\sqrt{4}}{\sqrt{3}}$$

$$\boxed{\frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}}}$$

$\therefore S = \{10\}$

Q NO: 15

$$\sqrt{\frac{z}{z+3}} = \sqrt{\frac{z+2}{z+6}}$$

Solve:-

$$\sqrt{\frac{z}{z+3}} = \sqrt{\frac{z+2}{z+6}}$$

Taking Square on b/s:

$$\left(\sqrt{\frac{z}{z+3}}\right)^2 = \left(\sqrt{\frac{z+2}{z+6}}\right)^2$$

$$\frac{z}{z+3} = \frac{z+2}{z+6}$$

$$z(z+6) = (z+2)(z+3)$$

$$z^2+6z = z(z+3)+2(z+3)$$

$$z^2+6z = z^2+3z+2z+6$$

$$z^2+6z = z^2+5z+6$$

$$z^2+6z-z^2-5z-6=0$$

$$6z-5z-6=0$$

$$z-6=0$$

$$\boxed{z=6}$$

check:-

put $z=6$ in original equation

$$\sqrt{\frac{z}{z+3}} = \sqrt{\frac{z+2}{z+6}}$$

$$\sqrt{\frac{6}{6+3}} = \sqrt{\frac{6+2}{6+6}}$$

$$\sqrt{\frac{6\cancel{2}}{\cancel{9}_3}} = \sqrt{\frac{\cancel{8}\ 2}{\cancel{12}\ 3}}$$

$$\sqrt{\frac{2}{3}} = \sqrt{\frac{2}{3}}$$

$\therefore S = \{6\}$

Q NO: 16

$\sqrt{5x-4} = \sqrt{7x+2}$

Solve:

$\sqrt{5x-4} = \sqrt{7x+2}$

Taking Square on b/s

$(\sqrt{5x-4})^2 = (\sqrt{7x+2})^2$

$5x - 4 = 7x + 2$

$5x - 7x = 2 + 4$

$-2x = 6$

$x = \frac{6}{-2}3$

$\boxed{x = -3}$

put $x = -3$ in original equation

$\sqrt{5x-4} = \sqrt{7x+2}$

$\sqrt{5(-3)-4} = \sqrt{7(-3)+2}$

$\sqrt{-15-4} = \sqrt{-21+2}$

$\sqrt{-19} = \sqrt{-19}$

$\{S = \{-3\}\}$